

Significant Achievements

- Spectacular success has been achieved in managing papaya mealybug in all papaya growing areas through national wide release of exotic parasitoid *Acerophagous papayae* leading to savings of Rs.1500 crore and complete avoidance of chemical insecticides.
 - The incidence of sugarcane woolly aphid has come down drastically during 2010-15 due to the inoculative release and conservation of predators *Dipha aphidivora*, *Micromus igorotus* and the parasitoid, *Encarsia flavoscutellum* in all sugarcane growing states of the country. This biocontrol technology has completely eliminated the usage of chemical pesticides for this pest and saved several crore of rupees in Maharashtra, Andhra Pradesh, Tamil Nadu, Karnataka and other sugarcane growing areas. The pest has been completely eradicated.
 - In rice, a very successful BIPM practice has been demonstrated and dissipated in 15000 ha of Kule lands in Kerala in past five years, which rejuvenated the paddy cultivation in the area.
 - BIPM technology against coconut rhinoceros beetle was successfully implemented in Kerala.
 - Demonstration of Bio intensive Pest Management in *Bt* cotton was conducted in Karnataka and Gujarat, which indicated that the BIPM technology as effective as farmers practice of using chemical pesticides. Highest net profit (Rs. 51144/ha) was recorded in BIPM plot compared to non BIPM plot (Rs. 42548/ha).
 - The mango leaf hoppers were effectively managed in Maharashtra and Tamil Nadu using *Metarhizium anisopliae*.
 - *Bacillus thuringiensis* formulation of NBAIR strain was found effective against pigeon pea pod borers in Karnataka, Tamil Nadu, Andhra Pradesh and Gujarat.
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- Large scale demonstrations and adoption of BIPM technology in rice in Kerala, Punjab and Uttarakhand resulted in significant increase in yield and reduced the cost of cultivation, resulting in increase in profit by Rs. 46,210/ha. The cost benefit ratio worked out to be 2.24 for BIPM plots, similarly it was 1.90 for non BIPM fields/farmers practice.
 - Large-scale dissemination of BIPM technology in sugarcane in Punjab over an area of 4230, 4429 and 4642 hectares during 2016-17, 2017-18 and 2018-19, respectively, resulted in substantial increase (145%) in the adoption and transfer of biocontrol technology. The regular releases of Tricho-cards by the IPM farmers have reduced the incidence of sugarcane borers by 53.5-61.0 per cent. The adoption of BIPM technology for the management of sugarcane borers has

resulted in saving of approximately Rs. 16,205 to 19,550/- per ha in comparison to chemical control with higher cost-benefit ratio.

- Conservation and inoculative release of *Encarsia guadeloupae* in the rugose spiraling whitefly (RSW) infested coconut gardens resulted in 72-88% decline in RSW incidence and the parasitoid population increased in the released garden significantly. Economic analysis of the impact of conservation and augmentation of *E. guadeloupae* for management of RSW in Tamil Nadu and Karnataka indicated that about Rs 9500/ha towards crop protection cost and 900 ml of pesticides/ha are being saved.
- Adoption of BIPM in maize for the control of stem borer, *Chilo partellus* has resulted in reduction of insecticides used in maize crop by 50-70%, giving a net return of approximately Rs. 10500/- per hectare to the farmers.
- Successful adoption of maize fall armyworm (FAW) management practices in Andhra Pradesh, Maharashtra, Odisha, Tamil Nadu and Karnataka during 2019-20 such as release of *Trichogramma pretiosum* / *Trichogramma chilonis* and application of *Metarhizium anisopliae* NBAIR -Ma 35 and NBAIR *Bt* 25 reduced the FAW incidence by 65 to 70 % and insecticide consumption by 50%.
- *Metarhizium anisopliae* (NBAIR Ma4) based biocontrol technology for the management of white grubs in sugarcane in Andhra Pradesh, Karnataka and Maharashtra was developed which is on par with chemical insecticides.
- *Helicoverpa armigera* nucleopolyhedrovirus (HearNPV) in chickpea in Karnataka indicated the efficacy of Hear NPV NBAIR , which was on par with chemical insecticide treatment